

SPILL PROOF SHELF ASSEMBLY METHOD
AND STRUCTURE

BACKGROUND OF THE INVENTION

[0001] This invention relates generally to shelves and, more particularly, to extendible shelves for use in refrigerators. This invention relates generally to

[0002] One type of extendible or "slide-out" refrigerator shelf assembly includes slide mechanisms and latch springs that engage a portion of a shelf when the shelf is in an extended position. The latch springs restrict movement of the shelf beyond a predetermined position and releasably hold the shelf in an extended position. See, for example, U. S. Patent No. 5,340,209.

[0003] Removal of slide out refrigerator shelves, however, is problematic because the slide mechanisms for the shelves must support the shelf in a fully or partially extended position and thus must securely couple the shelf to shelf supports. Consequently, removal or separation of the shelf from the supports is intricate and often awkward. Some removable slide-out shelves require extension of the shelf substantially beyond a normal fully extended position to release the shelf from the shelf supports. However, consumer confidence may decrease if the shelf becomes unbalanced.

BRIEF SUMMARY OF THE INVENTION

[0004] In one aspect, a system for limiting outward movement of a slide-out shelf includes a plurality of side supports configured to support the shelf, a positive stop extending along each of the side supports, and a plurality of support members configured to rigidly connect the side supports and contact at least a portion of the shelf thereby blocking forward movement of the shelf.

[0005] In another aspect, a method for assembling a shelf assembly is provided. The method includes providing a shelf that includes a forward edge, at least

one forward tab and at least one rear tab, providing at least one side support including at least one side support clearance, at least one gusset and at least one rear positive stop, and slidably coupling the shelf to the side supports.

[0006] In another aspect, a slide-out refrigerator shelf assembly includes a shelf including a first side, a forward tab laterally extending a first distance from the first side, and a rear tab laterally extending a second distance from the first side, the second distance less than the first distance. The shelf assembly also includes a first shelf side support comprising a laterally projecting ledge for sliding engagement with the shelf first side and the projecting ledge includes a rear portion having a first width sufficient to retain the rear tab, a forward portion having a second width less than the first width and providing a clearance for the rear tab and further providing a clearance for the forward tab, the clearance having a third width providing a clearance for the forward tab.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Figure 1 is a front perspective view of an exemplary refrigerator including an exemplary slide out shelf assembly;

[0008] Figure 2 is a perspective view of the slide-out shelf assembly shown in Figure 1 in an extended position;

[0009] Figure 3 is a top perspective view of the support frame shown in Figure 2;

[0010] Figure 4 is a side view of the support frame shown in Figure 2;

[0011] Figure 5 is a side view of the shelf rim shown in Figure 1;

[0012] Figure 6 is a partial magnified bottom perspective view of the middle portion of the shelf shown in Figure 5;

[0013] Figure 7 is a partial magnified bottom perspective view of the rear portion of the shelf shown in Figure 6;

[0014] Figure 8 is a bottom perspective view of the shelf assembly shown in Figure 2; and

[0015] Figure 9 is a partial magnified perspective view of the forward portion of Figure 8.

DETAILED DESCRIPTION OF THE INVENTION

[0016] Figure 1 is a perspective view of an exemplary large top mount refrigerator 10 including an outer cabinet 12 including a fresh food compartment 14 and a freezer compartment 16 separated by an internal wall 18. A fresh food door 20 and a freezer door 22 provide access to fresh food compartment 14 and to the freezer compartment 16, respectively. Fresh food door 20 typically includes a number of shelves 24 for storage of foodstuffs. A number of storage drawers 26 are provided in the lower portion of fresh food compartment 14, and a plurality of vertically adjustable shelf assemblies 28 and 30 on two rails 32 are provided in the upper portion of fresh food compartment 14. Shelf assembly 28 is a slide-out shelf assembly in a retracted position, and is selectively positionable from a retracted position (shown in Figure 1) to an extended position (described below) to allow convenient access to items placed upon shelf assembly 28.

[0017] While described and illustrated in the exemplary context of a middle shelf of a top mount refrigerator, it is contemplated that shelf assembly 28 could be used in other applications, including but not limited to other types of refrigerators, such as side-by-side refrigerators, as well as slide-out shelves, drawers, and bin assemblies for use in a wide variety of products of general application. As the benefits of the present invention accrue to uses well beyond use as a refrigerator shelf, the present invention is not limited to specific application in a refrigerator, such as, for example, refrigerator 10.

[0018] Figure 2 is a perspective view of slide-out shelf assembly 28 in an extended position. Shelf assembly 28 is mounted on rails 32 attached to a rear wall 34 of fresh food compartment 14 (shown in Figure 1). Shelf assembly 28 includes a support frame 36 and a glass encapsulated shelf 38. Frame 36 includes two

side supports 40, a forward support member 44 and a rear support member 46. Support members 44, 46 rigidly connect side supports 40. Each side support 40 includes a horizontally inwardly projecting doubly stepped flange or ledge 48, upon which shelf 38 slides. Shelf 38 includes a rectilinear transparent plate 52 held within grooves 54 of a surrounding rim 56 fabricated from a suitable plastic material such as, for example, acrylonitrile-butadiene-styrene (ABS) or high impact polystyrene (HIPS). An anti-spill guard 58 is positioned across the rear of rim 56 and is integral with rim 56. In an alternative embodiment, shelf 38 includes rectilinear transparent plate 52 held within grooves 54 of surrounding rim 56 by an ultrasound weld. A forward edge of rim 56 curves downwardly forming a handle 60 which a user may grasp to move shelf 38 between the extended position and the retracted position (shown in Figure 1) wherein anti-spill guard 58 is positioned substantially adjacent rear wall 34. In one embodiment, rim 56 is substantially symmetrical about a longitudinal axis 62.

[0019] Figure 3 is a top perspective view and Figure 4 is a side view of support frame 36. Each side support 40 includes a hook 70, a projection 72, and a rear stop 74 for engagement with vertical rails 32 (shown in Figure 2) to hold shelf assembly 28 (shown in Figure 2) at a selected elevation. In case of improper shelf installation, rear stops 74 facilitate preventing dislodgment of support frame 36 from rails 32.

[0020] Each ledge 48 includes a surface 76 upon which shelf 38 (shown in Figure 2) may slide. An inner surface 78 of supports 40 is substantially perpendicular to ledges 48, and shelf 38 is retained to side supports 40 partially above and partially below ledges 48 and between inner surfaces 78 as described further below. Each ledge 48 further includes a rear portion 80 having a first width, a forward portion 82 having a second width smaller than the first width, and a track clearance 84 having a third width smaller than the second width. A gusset 86 extends laterally inward from forward portion 82 of each side support 40 and includes an integral tab 88 extending upwardly from gusset 86. Tabs 88 are substantially adjacent to support member 44, and together facilitate preventing shelf 38 from extending beyond a fully extended position.

[0021] Figure 5 is a side view of shelf rim 56 including two lateral projections, namely, a forward stop tab 110 and a rear tab 112 extending from a side edge 102 below groove 54. Figures 6 and 7 provide magnified bottom perspective views of both forward stop tab 110 and rear tab 112. Forward stop tab 110 extends laterally outward, i.e., away from shelf longitudinal axis 106 (shown in Figure 3) from a lower portion 114 of side edge 102 for a first distance. Lower portion 114 is inwardly spaced from upper edges of 102 to form a sliding surface that rest upon surfaces 76 (shown in Figure 3) of side support 40 (shown in Figure 3) when shelf 38 (shown in Figure 2) is installed in support frame 36 (shown in Figure 2). Forward stop tab 110 includes sloped sides 116 to facilitate smooth movement of shelf 38 between extended and retracted positions and provides support to forward stop tabs 110. Sloped sides 116 facilitate the prevention of jamming shelf 38 in side supports 40 and gently direct shelf 38 into an advantageous centered position relative to side supports 40 as shelf 38 is moved relative to support frame 36.

[0022] Rear tab 112 extends laterally outward away from shelf longitudinal axis 106 (shown in Figure 3) from side edge 102 for a second distance less than the first distance for which forward stop tab 110 extends. In one embodiment, rear tab 112 extends laterally outward a distance equal to distance for which forward stop tab 110 extends. Additionally, rear tab 112 extends parallel with axis 106 and rear tab 112 includes a forward lip 120 and rear portion 122. Anti-spill guard 58 extends obliquely from a top surface 124 of rim 56, and rounded forward edge 60 extends downward from rim top surface 124. Anti spill guard 58 laterally extends above rim top surface 120 substantially the entire width of rim 56, and includes flared sides 132 to prevent jamming of anti-spill guard 58 when shelf 38 (shown in Figure 2) is installed onto support frame 36 (shown in Figures 2).

[0023] Figure 8 is a bottom perspective view of shelf assembly 28 in the extended position with left side edge 102 broken away, and Figure 9 is a magnified perspective view of a portion of Figure 8 illustrating the release of shelf forward stop tab 110 from side support 40. When shelf 38 is extended, forward stop tab 110 contacts gusset tab 88 (shown in Figure 4) and support member 44 and prevents further outward movement or extension of shelf 38, and rear tabs 112 are

positioned below side support ledge rear portion 80 so that shelf 38 is securely retained to side supports 40. The engagement of the forward stop tab 110 to gusset tab 88 and support member 44, respectively, communicate to the users that the shelf is fully extended. Additionally, the proximity of rear tab 112 to side support ledge forward portion 82 allows full release of shelf 38 only after following the below-described steps for removal.

[0024] Full release of shelf 38 is facilitated by pulling rim forward edge 60 of shelf 38 and positioning forward stop tabs 110 just below track clearances 84. Track clearances 84 are located adjacent on the front side of support member 44 and above gusset 88. Lifting rim forward edge 60 upwards when forward stop tabs 110 are located at track clearance 84 releases the forward portion of shelf 38 from side supports 40. By further pulling shelf 38 longitudinally away from side supports 40, rear tabs 112 reach a release position (not shown) in which rear tabs 112 are positioned forward of side support ledge rear portions 80 and within side support ledge forward portions 82 that are dimensioned to provide a lateral clearance for rear tabs 112. Shelf 38 may therefore be released by lifting rear tabs 112 upward and through side support ledge forward portions 82.

[0025] In one embodiment, a release position is provided wherein the extension is reduced by 2.54 centimeters of the normal fully extended position, and conveniently assures the user that full extension is achieved and stable. Once the release position is obtained, shelf 38 may be fully removed from side supports 40 by lifting shelf 38 upward and away from side supports 40. In another embodiment, the extension is reduced by other than 2.54 centimeters.

[0026] Return or installation of shelf 38 is accomplished by inserting rear tabs 112 in side support ledge forward portions 82, inserting forward stop tabs 110 into track clearances 84 and sliding shelf 38 backward over side supports 40 until shelf 38 is in a fully retracted position. Installation and removal of shelf 38 may be accomplished with one hand.

[0027] Thus, an extendible shelf assembly 28 is provided that securely couples shelf 38 to side supports 40 while allowing a user to remove and

reinstall shelf 38 from side supports 40 quickly and easily as desired such as, for example, cleaning of shelf 38. The deliberate extension required to place shelf 38 in the fully extended position relative to the release position allows shelf 38 to be extended back and forth with increased consumer confidence. Accordingly, a reliable and cost efficient shelf is provided. The shelf is a securely mountable and easily extendible slide-out shelf that is easily removed.

[0028] While the invention has been described in terms of various specific embodiments, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the claims.

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